X-Ray Microtomography of Fine Grained Rocks	X27A

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Two Paleocene core samples from the North Sea were imaged using X-Ray Computed Microtomography at Beamline X27A. Images have a voxel resolution of 6.5x6.5x6.5 microns and no chemical information is available in these data acquired at 40 keV. Thus, individual pores, which would be 2 microns or less for clays, cannot be resolved. A 3D image of the first sample shows numerous fractures. The intense fracturing around the edge of the sample is undoubtedly the result of coring. Interior fractures may be natural or may have resulted from expansion when the core was brought to the surface from a depth of more than 3 km. Fractures have typical widths of 30-40 microns and are at least partially interconnected. Using a simple parallel plate model for permeability, such a fracture network has permeabilities in the range of 1 to 10 milDarcy depending on the density and interconnectivity of the fractures.

The second North Sea core sample contains no fractures. However, it does show a lot of fine sand size grains with diameters of 50-100 microns. Some of these grains have very high X-ray absorption. A close up of two of the grains shows that one of the grains is zoned. We speculate that this zoned grain is diagenetic siderite, an Fe carbonate mineral which commonly forms as concretions in association with clay minerals. SEM and microprobe studies are underway to confirm this interpretation. At least 10% by volume of the imaged sample is large, high absorption grains indicating significant fluid flow, mass transport, and diagenesis.

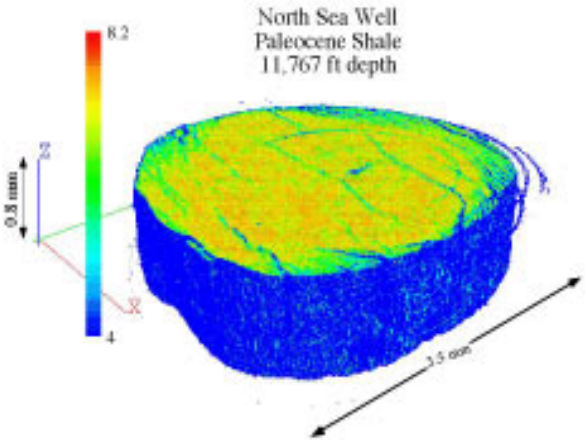

Figure 1. 3D Image of shale sample from a North Sea well showing X-Ray absorption with high values transparent. Blue regions are fractures with widths of 30-60 microns.